Title	Electroplated Zn-Ni nanocrystalline alloys as an efficient electrocatalyst cathode for the generation of hydrogen fuel in acid medium
Authors	H. Nady, **Mosaad Negem**
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Abstract

Energy conversion and renewable energy are the valuable research fields for the future of the energy. Synthesis of electroplated thin film of low cost elements and their alloys is promising nanomaterials for energy conversion. Electroplating of Zn-Ni alloys were performed using natural products such as cysteine and gluconate under direct current and ultrasound waves. The morphological and crystalline structures of the electroplated Zn-Ni alloys were examined using scanning electron microscopy, SEM, and X-ray diffraction techniques, XRD. The chemical composition of the electroplated Zn-Ni alloys was determined using energy dispersive X-ray analysis, EDX. The morphological structures of electroplated Zn-Ni alloys changed from smooth to coral reef-like and granular structures with the increase of Zn wt%. Electrocatalysis of the hydrogen evolution reaction using the electroplated Zn-Ni alloys was studied in 0.5 M H_2SO_4 medium by the cathodic polarization and electrochemical impedance spectroscopy, EIS. The electroplated Zn-9.5Ni cathode of cubic g-brass arrangement exhibits the highest rate of hydrogen evolution reaction.